

Keeping skin integrity: Par polarity matters

The skin is confronted with various environmental stimuli and exhibits a remarkable pool of stem cells and differentiated cells to face these challenges. A team of scientists based at CECAD in Cologne and led by Sandra Iden investigates the role of polarity proteins. Results of their research are now published in the Journal of Investigative Dermatology.

The skin is our most important barrier to the outside world. Thereby it is under constant stress by UV-light, mechanical, chemical or microbial insults and changes in temperature. Moreover, skin integrity is crucial for limiting the loss of water from the organism. To fulfill these diverse functions, the skin epithelium needs to constantly self-renew with the help of skin stem cells. Sandra Iden and her team uncovered that the polarity protein Par3 serves a crucial role in keeping the skin's function.

Polarity proteins have been previously identified in invertebrates where they control the shape and function of many cell types. The new data by the Cologne group show that the mammalian polarity protein Par3 takes part in forming a proper skin barrier and balancing stem cell potential versus differentiation. „These results contribute to a better understanding of the biology of skin stem cells and suggest that impaired regulation of cell polarity promotes skin aging. This knowledge may help developing future diagnostics and therapies of skin diseases“ states Sandra Iden.

The study was performed in young and old mice in which the polarity protein Par3 was inactivated in the upper layer of the skin, the epidermis. This resulted in premature differentiation, loss of hair follicle stem cells and a defective barrier function of the skin. „The reason for the defective barrier is most likely a deregulation of tight junction proteins, which normally seal epithelial sheets and control the restricted passage of molecules between neighbouring cells.“ says Noelle Ali, first author of the paper. Her colleague Martim Dias Gomes adds: „It is striking that the role of polarity proteins is so versatile within one tissue, and that the Par3 function in tissue homeostasis appears to be conserved from invertebrates to complex mammals. “

With their research the scientists of CECAD, the Cluster of Excellence for aging research, show that the correct regulation of cell polarity is important for key functions of the skin, thereby maintaining an important barrier-forming tissue.

Original publication:

[Ali NJA](#), [Dias Gomes M](#), [Bauer R](#), [Brodesser S](#), [Niemann C](#), and [Iden S](#) (2016).

Essential role of polarity protein Par3 for epidermal homeostasis through regulation of barrier function, keratinocyte differentiation and stem cell maintenance.

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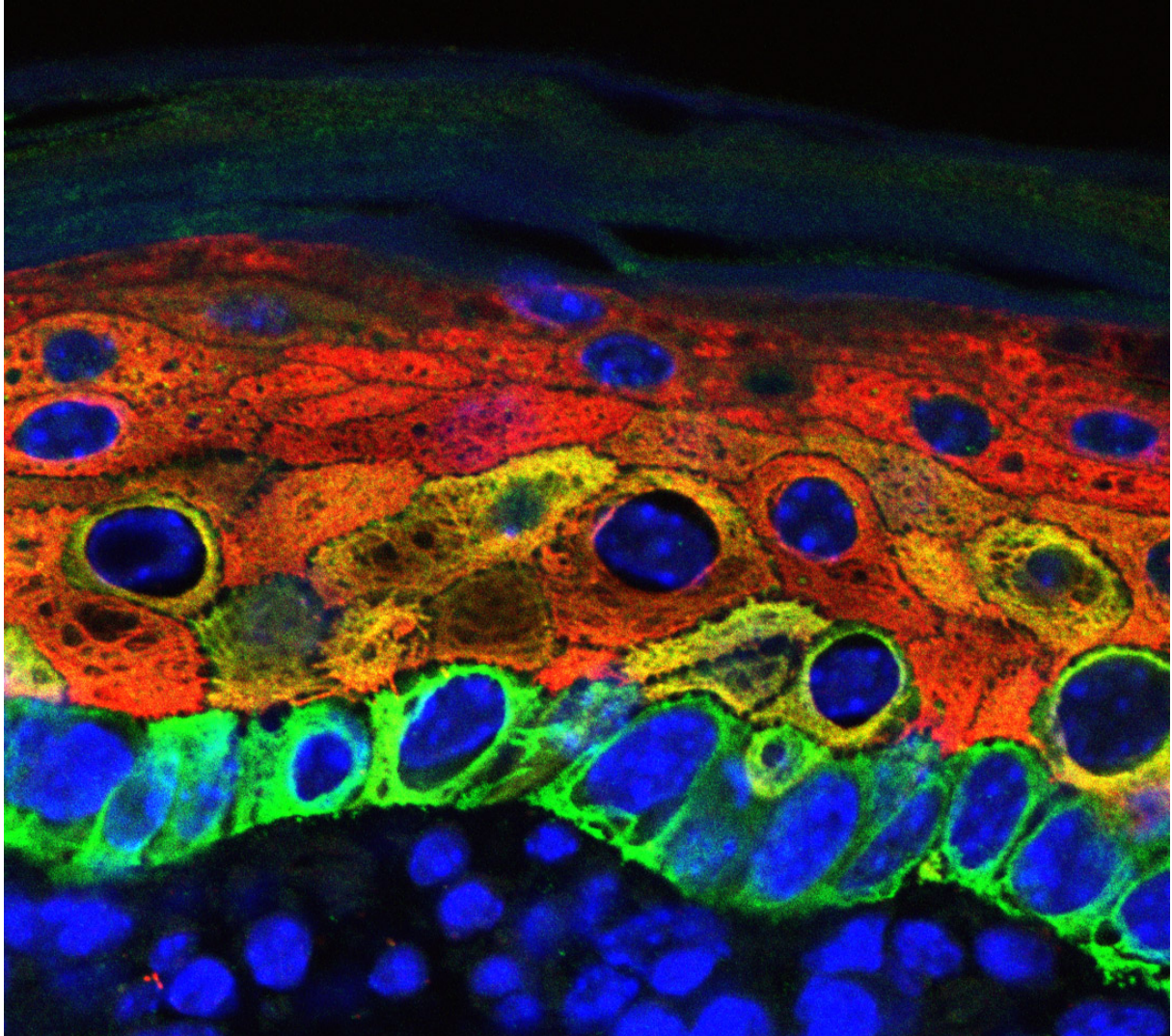
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Cross-section of newborn mouse epidermis. Basal layer keratinocytes are visualized by anti-Keratin-14 immunostaining (green), whereas differentiated keratinocytes in the upper epidermal layers are stained for Keratin-1 (red).